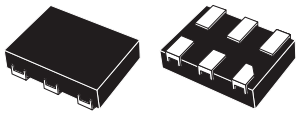
74AUP1G125

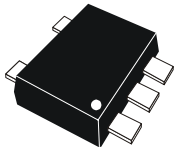
Low power single tristate buffer

Features

- High speed: t_{PD} = 6.3 ns (max.) at V_{CC} = 2.3 V
- Power down protection on inputs and outputs
- Balanced propagation delays:
  $t_{PLH} \approx t_{PHL}$
- Operating voltage range:
  V_{CC} (opr) = 1.2 to 3.6 V
- Low power dissipation:
  I_{CC} = 1 µA (max.) at T_A = 85 °C
- Latch-up performance exceeds 300 mA (JESD 78, Class II)
- ESD performance:
  - 2000-V human body model (A114-A)
  - 200-V machine model (A115-A)
  - 1000-V charged device model (C101)



DFN6L



SOT-665

Applications

- Mobile phones
- Personal digital assistants (PDAs)

Description

The 74AUP1G125 is a low voltage CMOS single tristate buffer fabricated with sub-micron silicon gate and double-layer metal wiring C^2MOS technology. It is ideal for 1.2 to 3.6 V operations and low power and low noise applications.

All inputs and outputs are equipped with protection circuits against static discharge, giving them 2 kV ESD immunity and transient excess voltage.

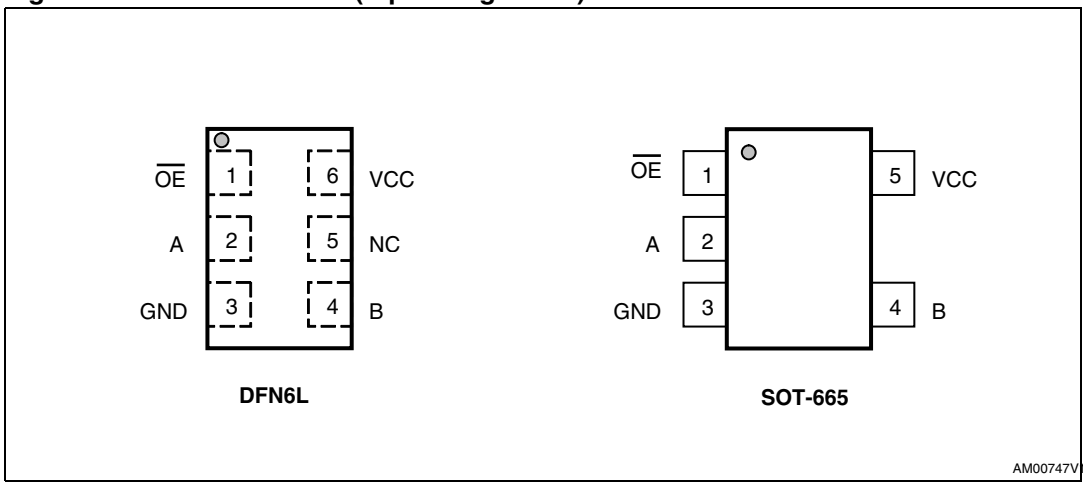
Table 1. Device summary

Order code	Package	Packing
74AUP1G125DTR	DFN6L (1.2 x 1 mm)	Tape and reel
74AUP1G125GTR	SOT-665 (1.6 x 1.6 mm)	Tape and reel

1 Pin settings

1.1 Pin connection

Figure 1. Pin connection (top through view)



1.2 Pin description

Table 2. Pin assignment

DFN pin number	SOT pin number	Symbol	Name and function
1	1	$\overline{OE}$	Active low output enable
2	2	A	Data input
3	3	GND	Ground (0V)
4	4	B	Data output
5	-	NC	Not connected
6	5	V_{CC}	Positive supply voltage

1.3 Truth table

Figure 2. Truth table

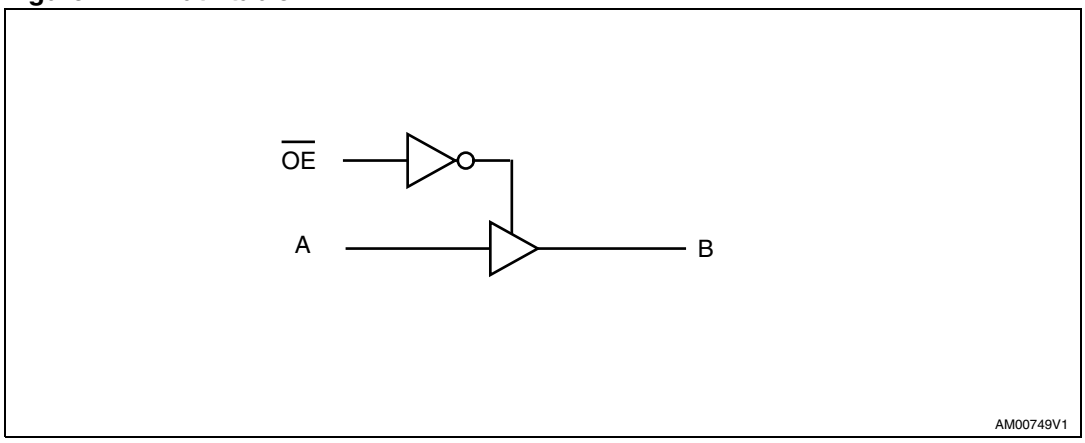
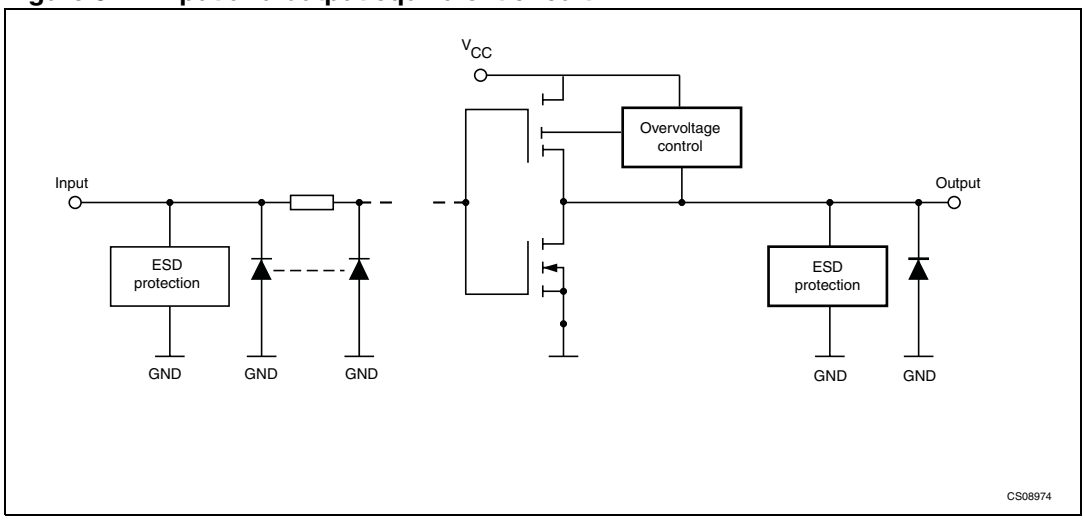


Table 3. Truth table

$\overline{OE}$	A	B
L	L	L
L	H	H
H	X	Z

Figure 3. Input and output equivalent circuit



2 Maximum rating

Stressing the device above the rating listed in the “absolute maximum ratings” table may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Table 4. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage	-0.5 to +4.6	V
V_I	DC input voltage	-0.5 to +4.6	V
V_O	DC output voltage (V_{CC} = 0 V)	-0.5 to +4.6	V
V_O	DC output voltage (high or low state)	-0.5 to V_{CC} + 0.5	V
I_{IK}	DC input diode current	-20	mA
I_{OK}	DC output diode current	-50	mA
I_O	DC output current	±50	mA
I_{CC}	DC supply current per supply pin	±100	mA
I_{GND}	DC ground current per supply pin	±100	mA
P_D	Power dissipation	200	mW
T_{stg}	Storage temperature	-65 to +150	°C
T_L	Lead temperature (10 sec)	260	°C

2.1 Recommended operating conditions

Table 5. Recommended operating conditions

Symbol	Parameter		Value	Unit
V_{CC}	Supply voltage		1.2 to 3.6	V
V_I	Input voltage		0 to V_{CC}	V
V_O	Output voltage		0 to V_{CC}	V
T_{op}	Operating temperature		-40 to 85	°C
dt/dv	Input rise and fall time	V_{CC} = 3.0 to 3.6 V	10	ns/V
		V_{CC} = 2.3 to 2.7 V	20	ns/V
		V_{CC} = 1.2 to 1.95 V	100	ns/V

3 Electrical characteristics

Table 6. DC specifications

Symbol	Parameter	V_{CC} (V)	Test condition	Value		Value		Unit
				25 °C		-40 to 85 °C		
				Min	Max	Min	Max	
V_{IH}	High level input voltage	1.2 to 1.95	-	0.65 V_{CC}	-	0.65 V_{CC}	-	V
		2.0 to 2.7	-	1.6	-	1.6	-	
		2.75 to 3.6	-	2.0	-	2.0	-	
V_{IL}	Low level input voltage	1.2 to 1.95	-	-	0.35 V_{CC}		0.35V_{CC}	V
		2.0 to 2.7	-	-	0.7		0.7	
		2.75 to 3.6	-	-	0.8		0.8	
V_{OH}	High level output voltage	1.2 to 3.6	I_{OH} = -100 µA	V_{CC} – 0.2	-	V_{CC} – 0.2	-	V
		3.0	I_{OH} = -10 mA	2.45	-	2.4	-	
		2.3	I_{OH} = -6 mA	1.85	-	1.8	-	
		1.65	I_{OH} = -4 mA	1.30	-	1.25	-	
		1.4	I_{OH} = -2 mA	1.10	-	1.05	-	
		1.2	I_{OH} = -1 mA	1.00	-	0.95	-	
V_{OL}	Low level output voltage	1.2 to 3.6	I_O = 100 µA	-	0.15	-	0.20	V
		3.0	I_O = 10 mA	-	0.50	-	0.55	
		2.3	I_O = 6 mA	-	0.35	-	0.40	
		1.65	I_O = 4 mA	-	0.35	-	0.40	
		1.4	I_O = 2 mA	-	0.25	-	0.30	
		1.2	I_O = 1 mA	-	0.20	-	0.25	
I_I	Input leakage current	0 to 3.6	V_I = GND to 3.6	-	±0.1	-	±0.5	µA
I_{off}	Power off leakage current	0	V_I or V_O = 0 to 3.6 V	-	±0.1	-	±1.0	µA
I_{CC}	Quiescent supply current	1.2 to 3.6	V_I = V_{CC} or GND	-	0.1	-	1	µA
ΔI_{CC}	I_{CC} increment per input	3.3	V_I = V_{CC} - 0.6V, I_O = 0	-	80	-	100	µA

Table 7. AC electrical characteristics

Symbol	Parameter	V_{CC} (V)	Test condition	Value			Unit
			C_L (pF)	25 °C	-40 to 85 °C		
				Typ	Min	Max	
t_{PLH}, t_{PHL}	Propagation delay time	1.1 to 1.3	5	5.7	-	8.9	ns
		1.4 to 1.6		3.5	-	5.6	
		1.65 to 1.95		3.0	-	4.9	
		2.3 to 2.7		2.9	-	4.0	
		3.0 to 3.6		2.5	-	3.4	
		1.1 to 1.3	10	7.0	-	10.6	
		1.4 to 1.6		3.9	-	6.0	
		1.65 to 1.95		3.4	-	5.2	
		2.3 to 2.7		2.8	-	4.1	
		3.0 to 3.6		2.6	-	3.8	
		1.1 to 1.3	15	8.0	-	11.8	
		1.4 to 1.6		4.4	-	5.9	
		1.65 to 1.95		3.8	-	5.8	
		2.3 to 2.7		3.1	-	4.4	
		3.0 to 3.6		2.9	-	4.2	
		1.1 to 1.3	30	10.2	-	15.6	
		1.4 to 1.6		5.7	-	9.4	
		1.65 to 1.95		5.3	-	8.3	
		2.3 to 2.7		4.5	-	6.3	
		3.0 to 3.6		4.2	-	6.0	

Table 7. AC electrical characteristics (continued)

Symbol	Parameter	V_{CC} (V)	Test condition	Value			Unit
			C_L (pF)	25 °C	-40 to 85 °C		
				Typ	Min	Max	
tPZH tPZL	Enable time	1.1 to 1.3	5	6.3	-	9.8	ns
		1.4 to 1.6		4.2	-	6.7	
		1.65 to 1.95		3.3	-	5.4	
		2.3 to 2.7		2.3	-	3.2	
		3.0 to 3.6		1.7	-	2.3	
		1.1 to 1.3	10	6.8	-	10.3	
		1.4 to 1.6		4.6	-	7.0	
		1.65 to 1.95		3.6	-	5.5	
		2.3 to 2.7		2.6	-	3.9	
		3.0 to 3.6		2.1	-	3.1	
		1.1 to 1.3	15	7.2	-	10.6	
		1.4 to 1.6		5.1	-	6.9	
		1.65 to 1.95		4.1	-	6.2	
		2.3 to 2.7		2.8	-	4.0	
		3.0 to 3.6		2.3	-	3.3	
		1.1 to 1.3	30	8.7	-	13.3	
		1.4 to 1.6		6.0	-	9.9	
		1.65 to 1.95		4.9	-	7.7	
		2.3 to 2.7		3.3	-	4.6	
		3.0 to 3.6		2.8	-	4.0	

Table 7. AC electrical characteristics (continued)

Symbol	Parameter	V_{CC} (V)	Test condition	Value			Unit
			C_L (pF)	25 °C	-40 to 85 °C		
				Typ	Min	Max	
tPHZ tPLZ	Disable time	1.1 to 1.3	5	6.9	-	10.7	ns
		1.4 to 1.6		4.3	-	6.9	
		1.65 to 1.95		4.1	-	6.7	
		2.3 to 2.7		2.4	-	3.3	
		3.0 to 3.6		2.3	-	3.2	
		1.1 to 1.3	10	7.7	-	11.7	
		1.4 to 1.6		5.4	-	8.2	
		1.65 to 1.95		5.0	-	7.6	
		2.3 to 2.7		4.3	-	6.3	
		3.0 to 3.6		4.1	-	5.9	
		1.1 to 1.3	15	8.1	-	11.9	
		1.4 to 1.6		5.5	-	7.4	
		1.65 to 1.95		5.1	-	7.7	
		2.3 to 2.7		4.4	-	6.3	
		3.0 to 3.6		4.2	-	6.0	
		1.1 to 1.3	30	12.0	-	18.3	
		1.4 to 1.6		6.4	-	10.5	
		1.65 to 1.95		5.9	-	9.3	
		2.3 to 2.7		5.5	-	7.7	
		3.0 to 3.6		5.4	-	7.6	

Table 8. Capacitive characteristics

Symbol	Parameter	V_{CC} (V)	Test condition	Value			Unit
				T_A = 25 °C			
				Min	Typ	Max	
C_I	Input capacitance	0	V_I = 0 or V_{CC}	-	4	-	pF
		3.6	V_I = 0 or V_{CC}	-	4	-	
C_O	Output capacitance	3.6	V_I = 0 or V_{CC}	-	7	-	pF
C_{PD}	Power dissipation capacitance	3.6	f = 10 MHz	-	15	-	pF

4 Test circuit

Figure 4. Test circuit

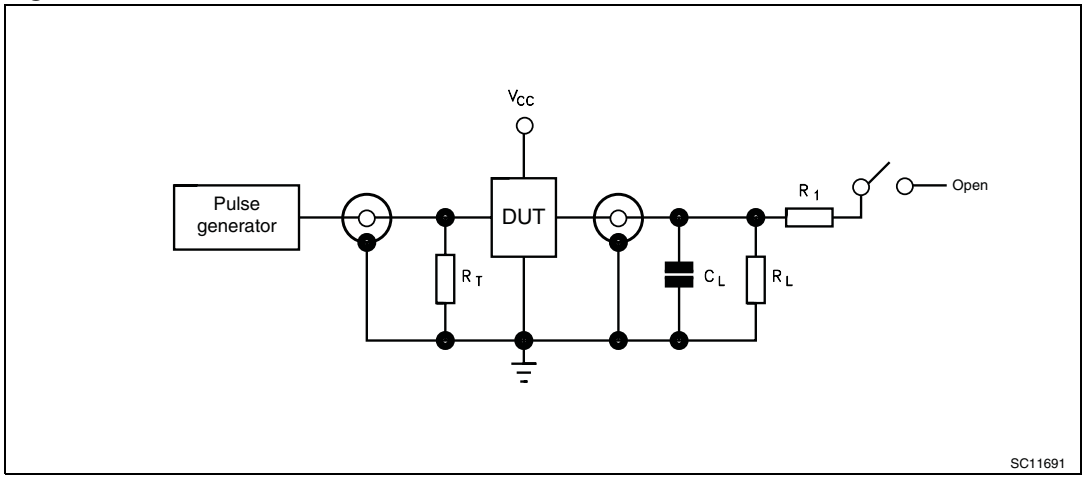


Table 9. Test setting

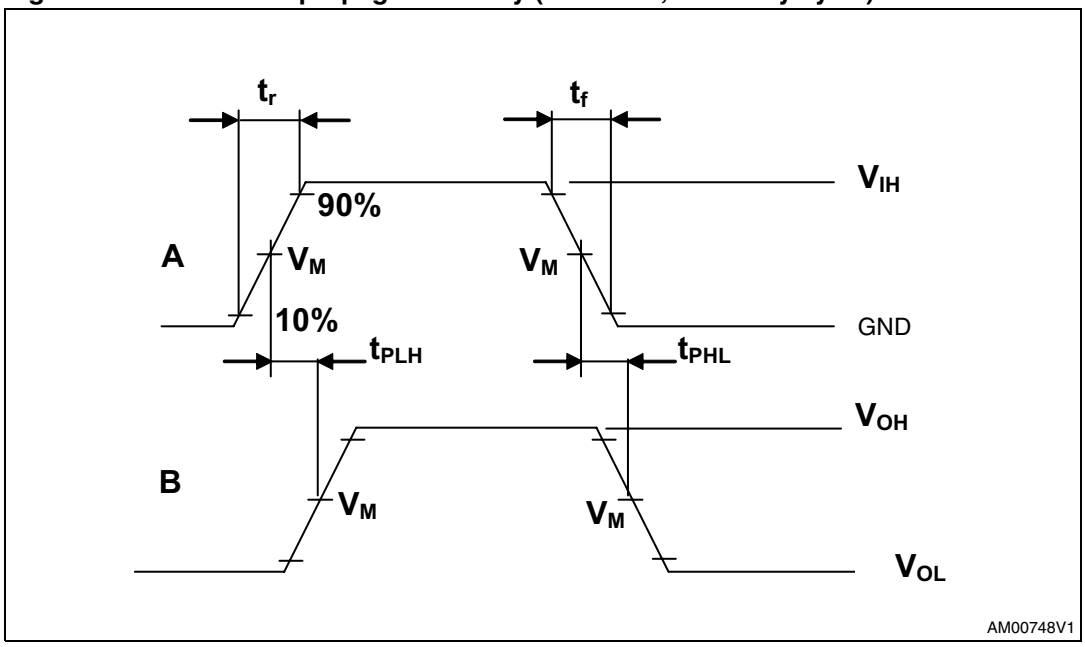
Test	Switch
t_{PLH}, t_{PHL}	Open

Table 10. Symbol and values for test circuit and waveform

Symbol	V_{CC}				
	1.2 ± 0.1 V	1.5 ± 0.1 V	1.8 ± 0.15 V	2.5 ± 0.2 V	3.3 ± 0.3 V
C_L	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF	5, 10, 15, 30 pF
R_L	500 Ω	500 Ω	500 Ω	500 Ω	500 Ω
V_M	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	1.5
V_{IH}	V_{CC}	V_{CC}	V_{CC}	V_{CC}	V_{CC}
$t_r = t_f$	≤ 2 ns	≤2 ns	≤2 ns	≤2 ns	≤2 ns

$R_T = Z_{OUT}$ of pulse generator (typically 50 Ω)

Figure 5. Waveform: propagation delay (f = 1 MHz; 50% duty cycle)



5 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Figure 6. Package outline for DFN6L (1.2 x 1 mm)

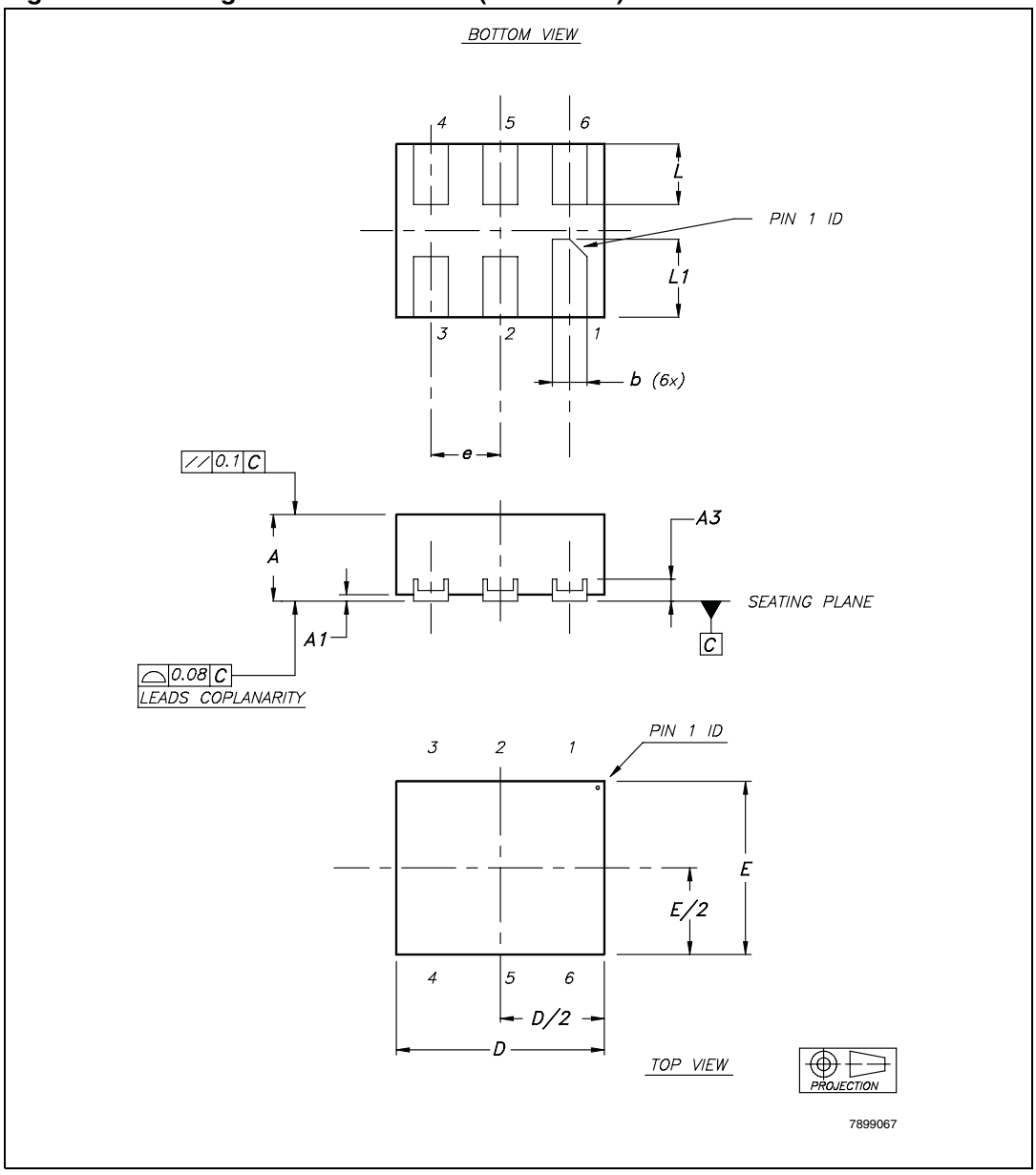


Table 11. Package mechanical data for DFN6L (1.2 x 1 mm)

Symbol	Millimeters		
	Typ	Min	Max
A	0.50	0.45	0.55
A1	0.02	0	0.05
A3	0.127	–	–
b	0.20	0.15	0.25
D	1.20	1.15	1.25
E	1	0.95	1.05
e	0.40	–	–
L	0.35	0.30	0.40
L1	0.45	0.40	0.50

Figure 7. Package footprint for DFN6L (1.2 x 1 mm)

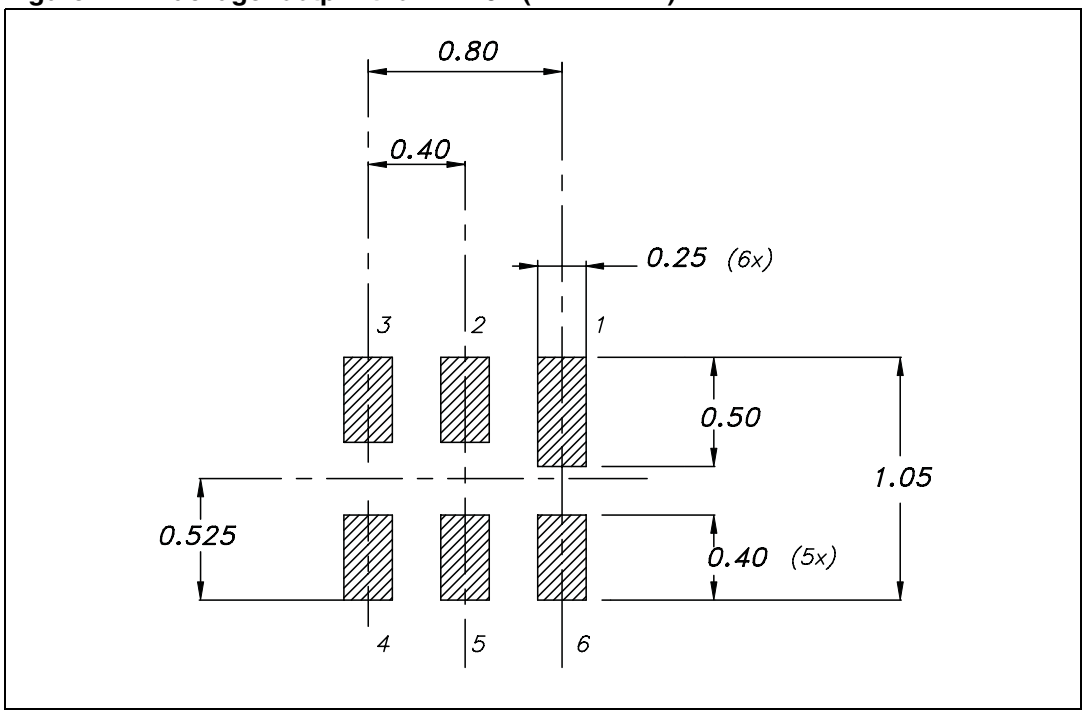


Figure 8. Package outline for SOT-665 (1.6 x 1.6 mm)

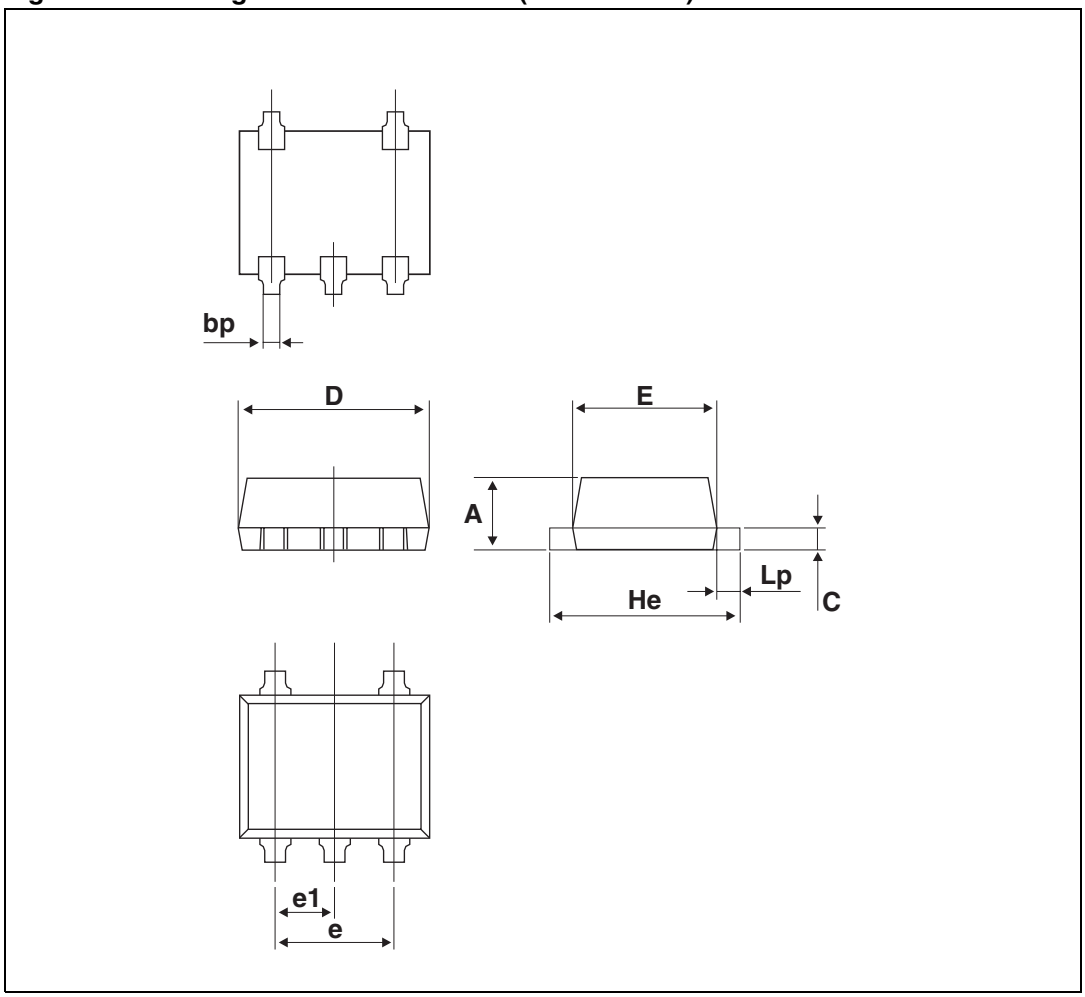


Table 12. Mechanical data for SOT665 (1.6 x 1.6 mm)

Symbol	Millimeters		
	Typ	Min	Max
A		0.50	0.60
bp		0.17	0.27
c		0.08	0.18
D		1.5	1.7
E		1.1	1.3
e	1		
e1	0.5		
He		1.5	1.7
Lp		0.1	0.3

Figure 9. Package footprint for SOT-665 (1.6 x 1.6 mm)

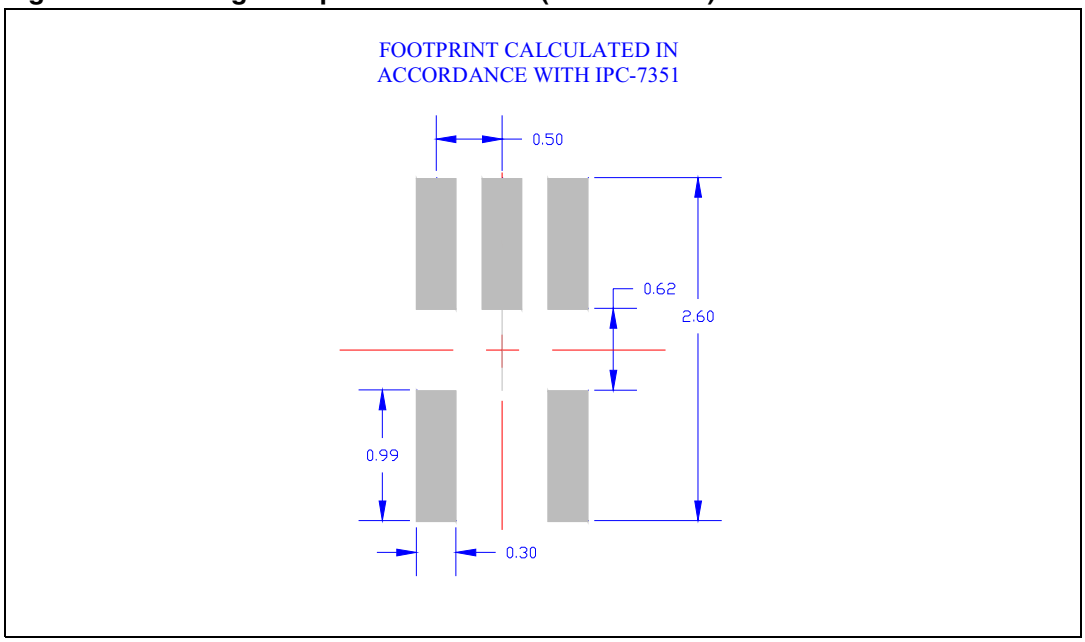
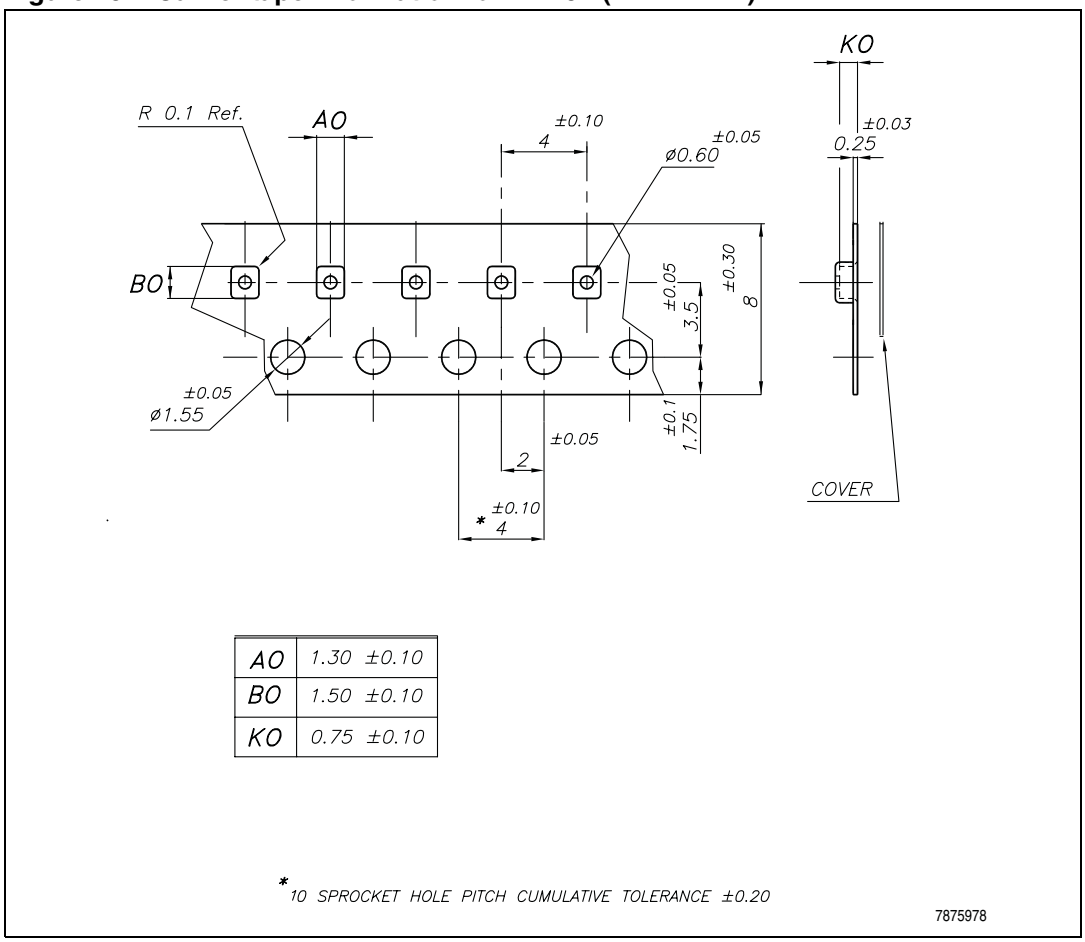


Figure 10. Carrier tape information for DFN6L (1.2 x 1 mm)



AO	1.30 ±0.10
BO	1.50 ±0.10
KO	0.75 ±0.10

Figure 11. Reel information drawing (back view) for DFN6L (1.2 x 1 mm)

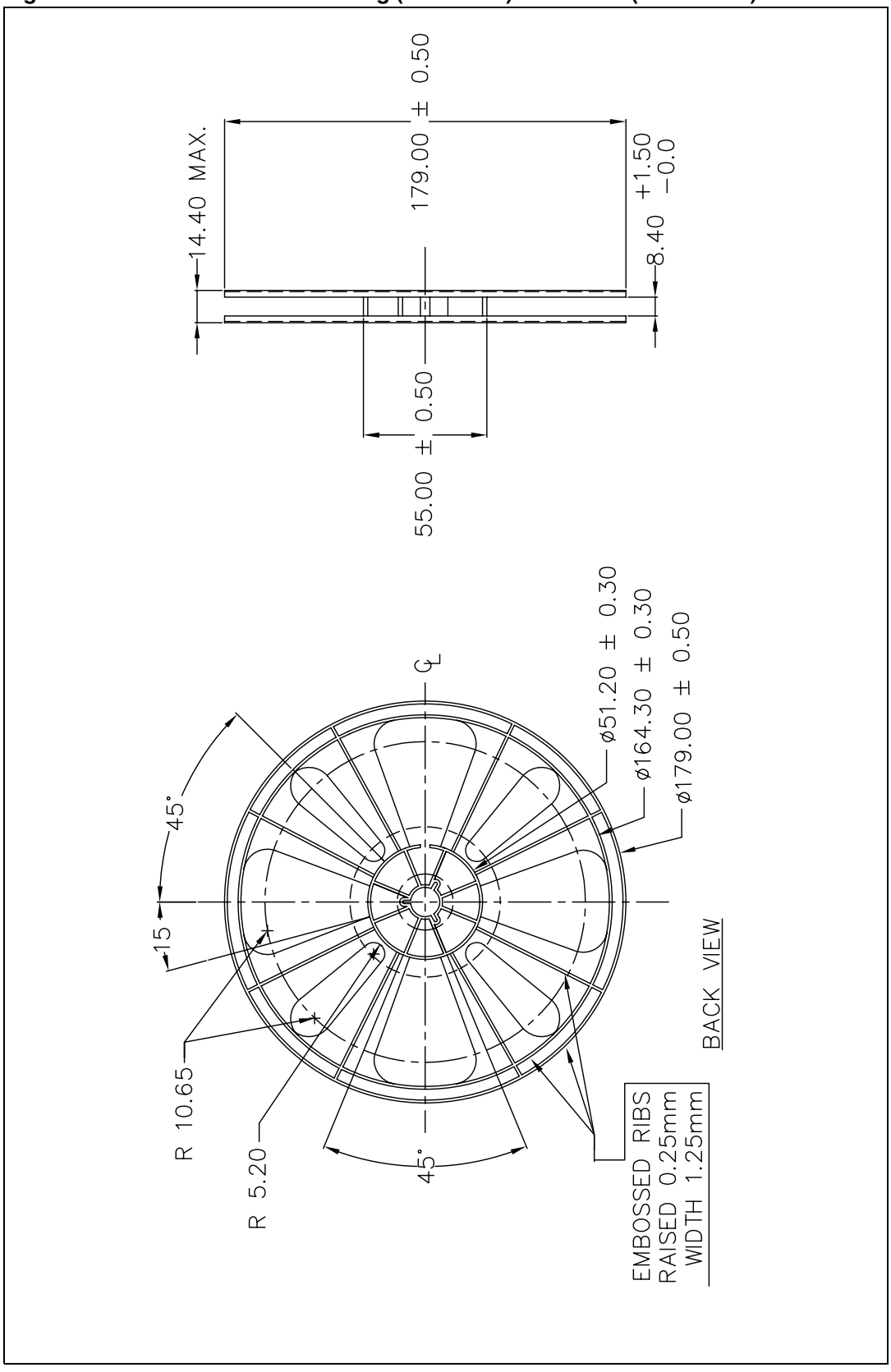


Figure 12. Reel information drawing (front view) for DFN6L (1.2 x 1 mm)

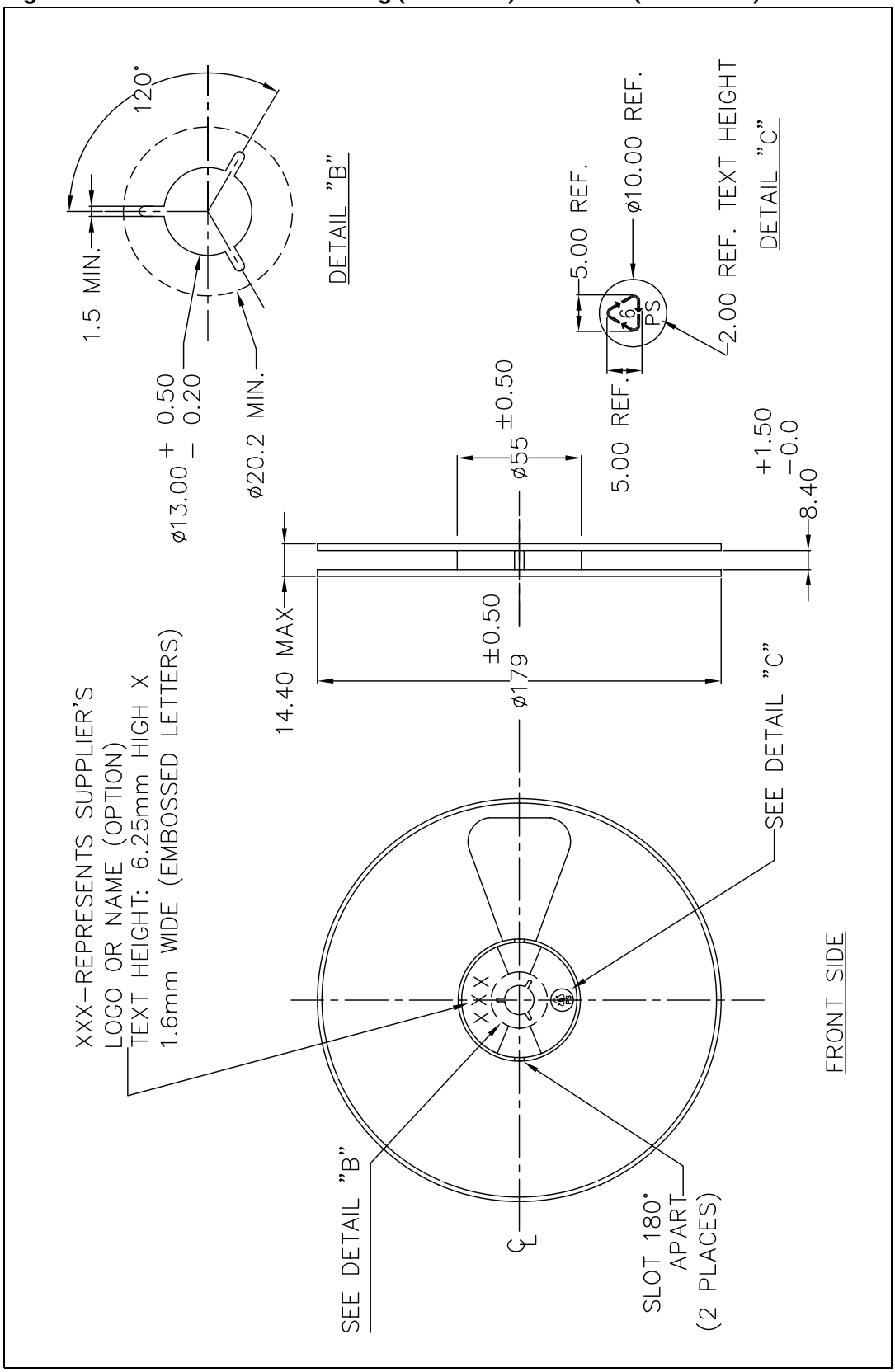


Figure 13. Carrier tape information for SOT-665 (1.6 x 1.6 mm)

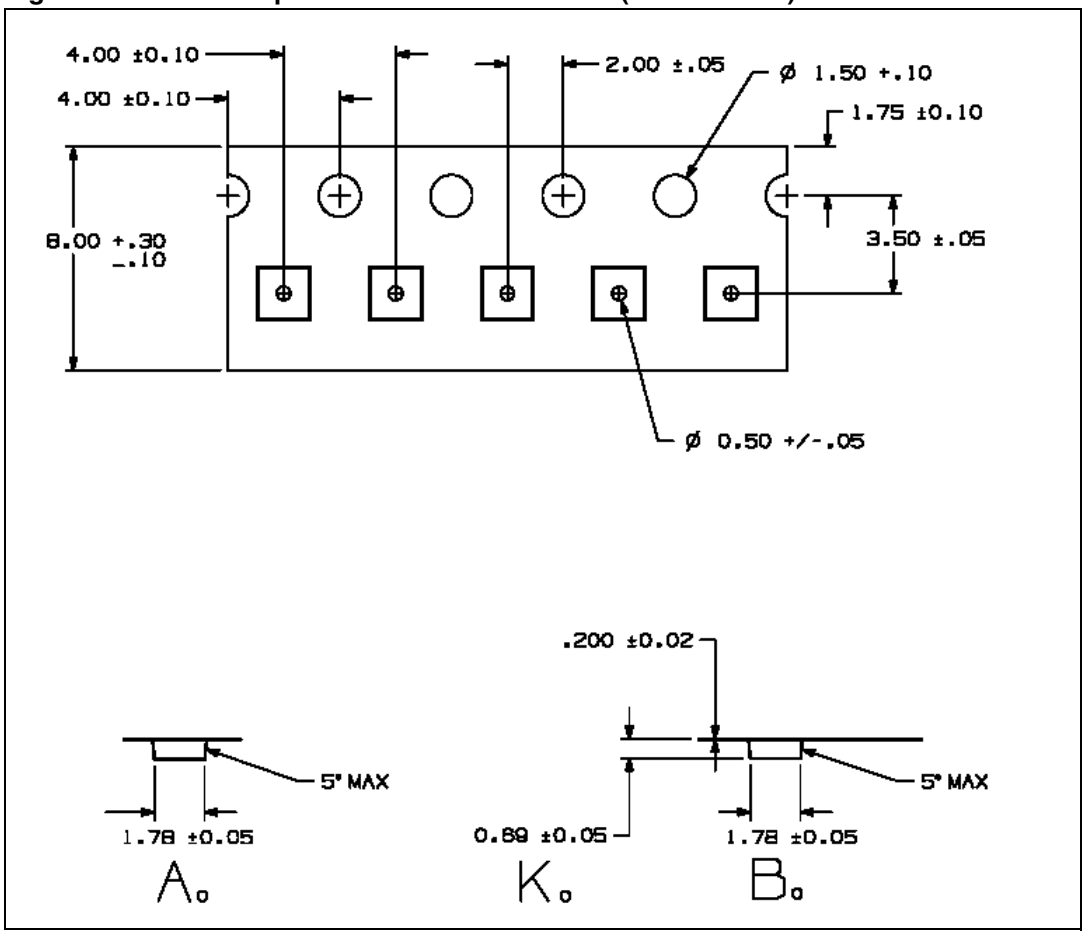


Figure 14. Reel information for SOT-665 (1.6 x 1.6 mm)

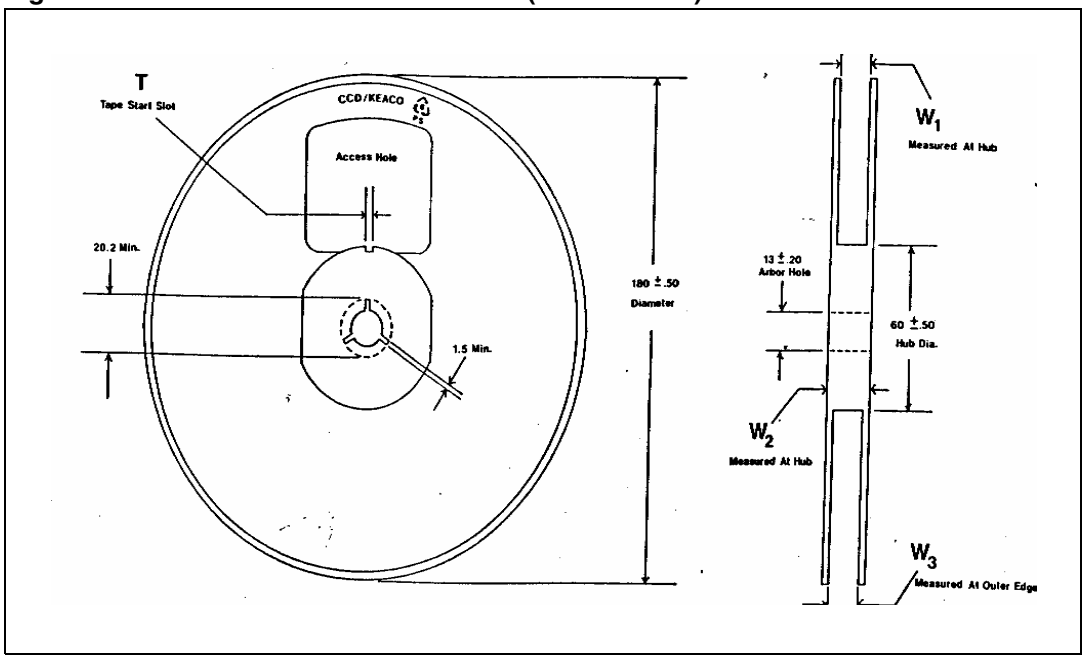


Table 13. Reel description for SOT-665 (1.6 x 1.6 mm)

Value[1]	R1	R2	R3	eint (at hub)	e1	W1	W2	W3
Min	12.8	175	59.5	8.4	1.5	8.4		7.9
Typ	13	180	60	8.4		8.4		9.4
Max	13.2	185	60.5	10		10	14.4	10.9

1. Millimeters.

6 Revision history

Table 14. Document revision history

Date	Revision	Changes
02-Jun-2009	1	Initial release.

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